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(54) **LEAKAGE CURRENT DETECTING  
CIRCUIT-BREAKER WITH A FLEXIBLE  
SHIELD CORD**

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**H02H 3/33** (2006.01)

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CPC ..... **H02H 3/33** (2013.01)

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USPC ..... 361/42  
See application file for complete search history.

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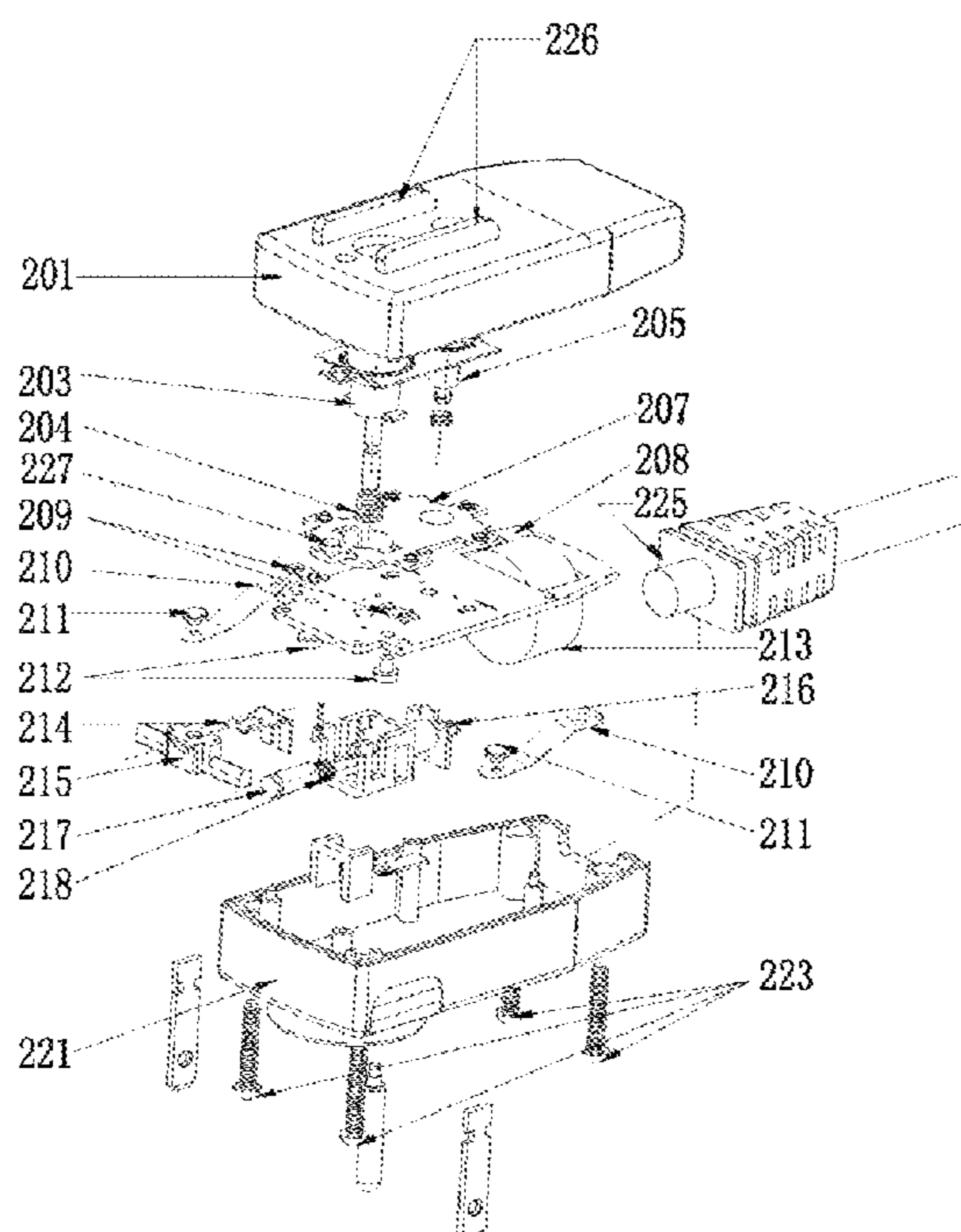
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(57) **ABSTRACT**

The present invention discloses a leakage current detecting circuit-breaker with a flexible shield cord, which comprises a detection circuit, a trigger circuit and a tripping mechanism. The detection circuit comprises a flexible shield cord, a zero sequence current transformer and diodes connected in series. The flexible shield cord comprises a foil wrapped around outer insulating layers of a live line and a neutral line and a tinned copper wire between the outer insulating layers and the foil. The flexible shield cord senses an abnormal or fault signal of a power line, and the zero sequence current transformer amplifies the abnormal or fault signal to such an extent as to trigger the trigger circuit. The diodes comprise a fifth diode and a sixth diode; anodes of the fifth diode and the sixth diode are connected to each other, and cathodes of the fifth diode and the sixth diode are respectively connected to the live line and the neutral line. The leakage current detecting circuit-breaker is of low production cost and strong anti-interference capacity.

**3 Claims, 5 Drawing Sheets**



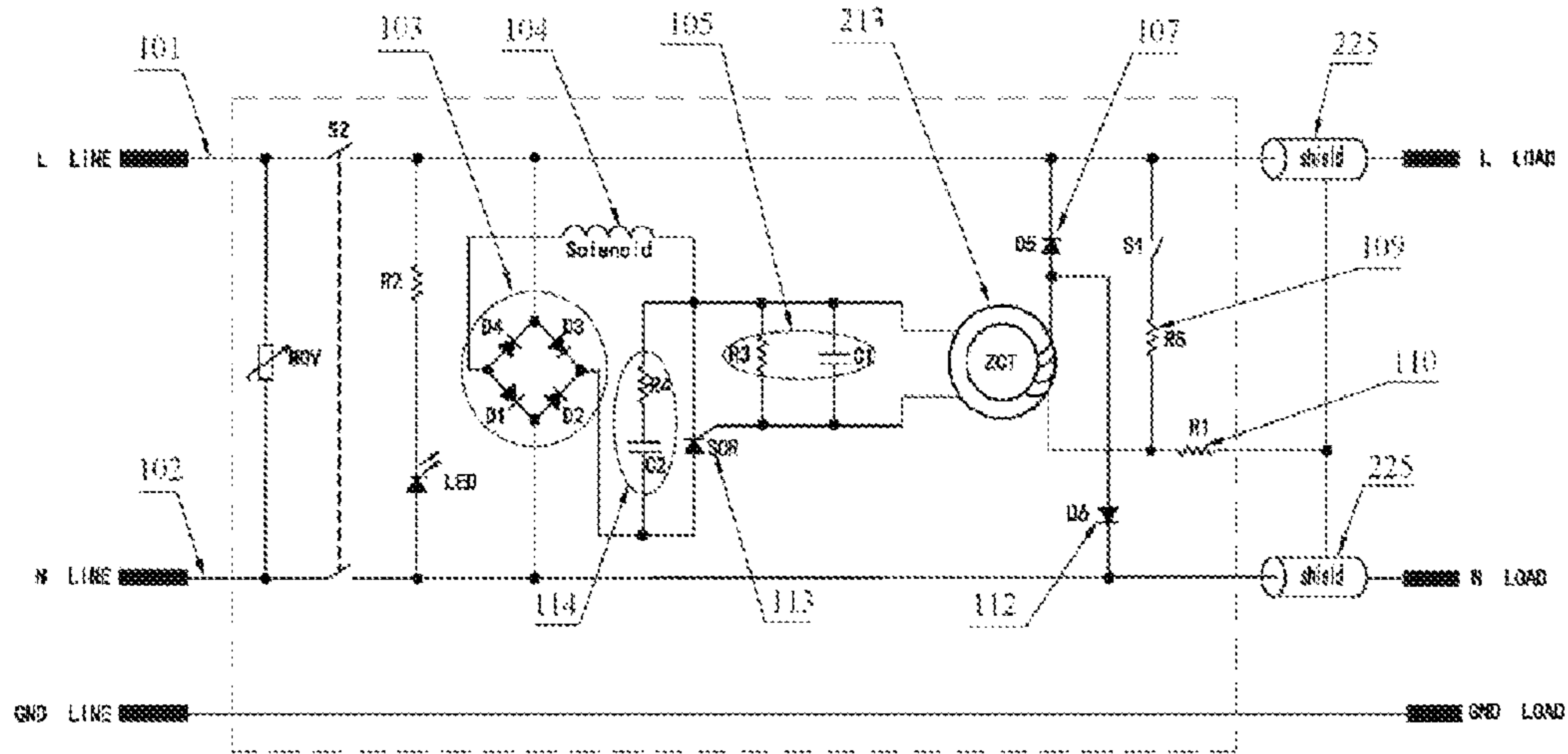


FIG. 1

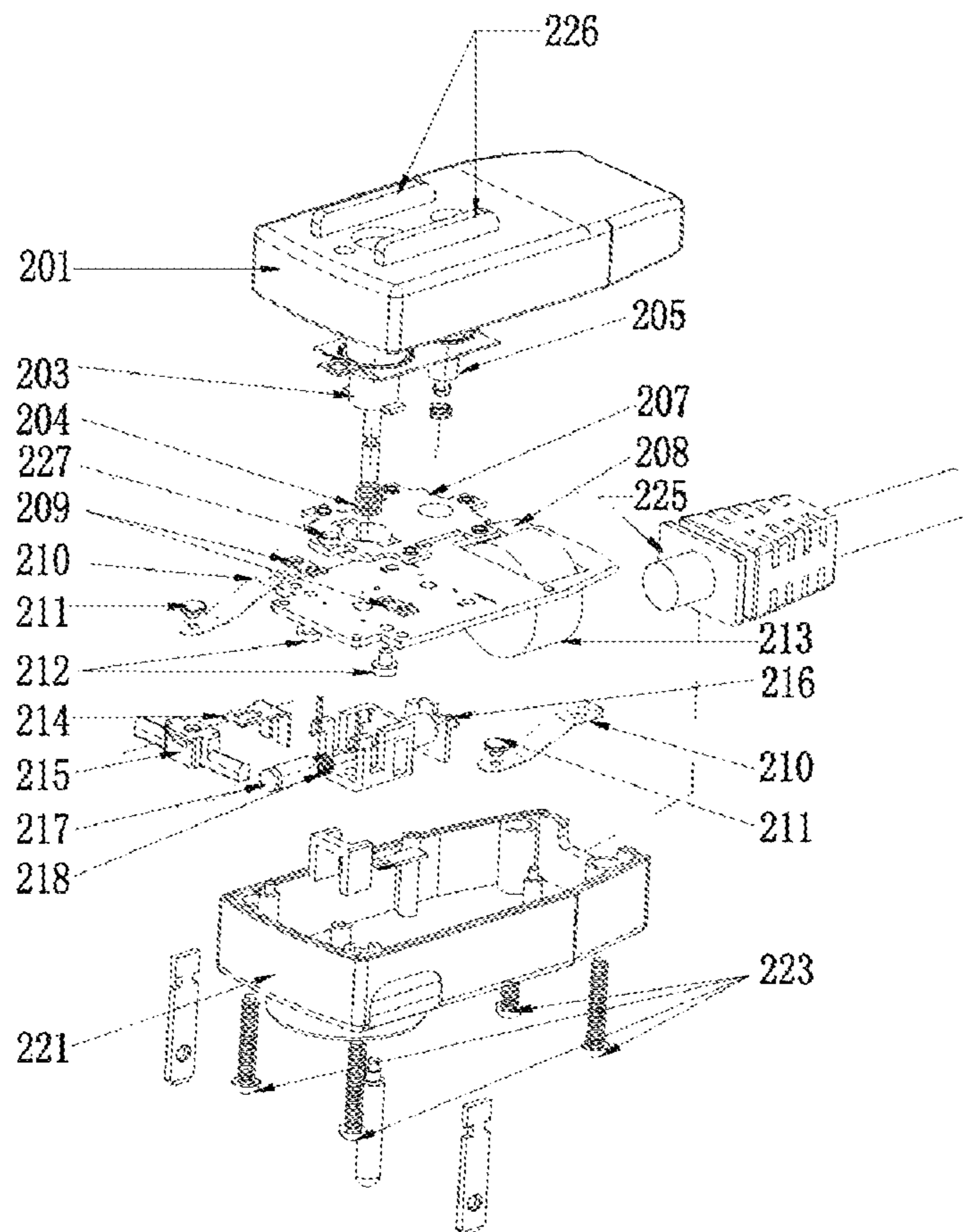


FIG. 2

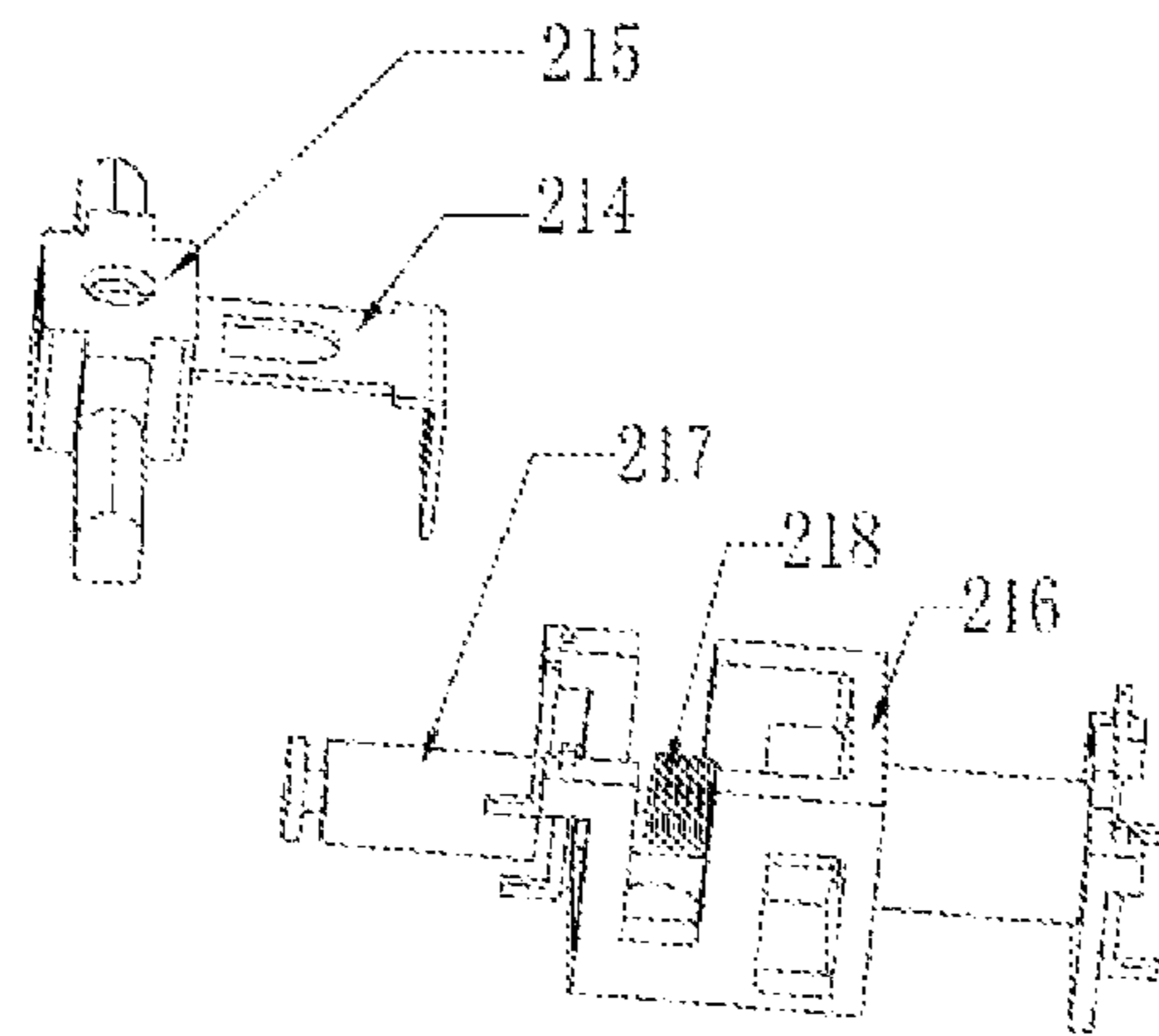


FIG. 3

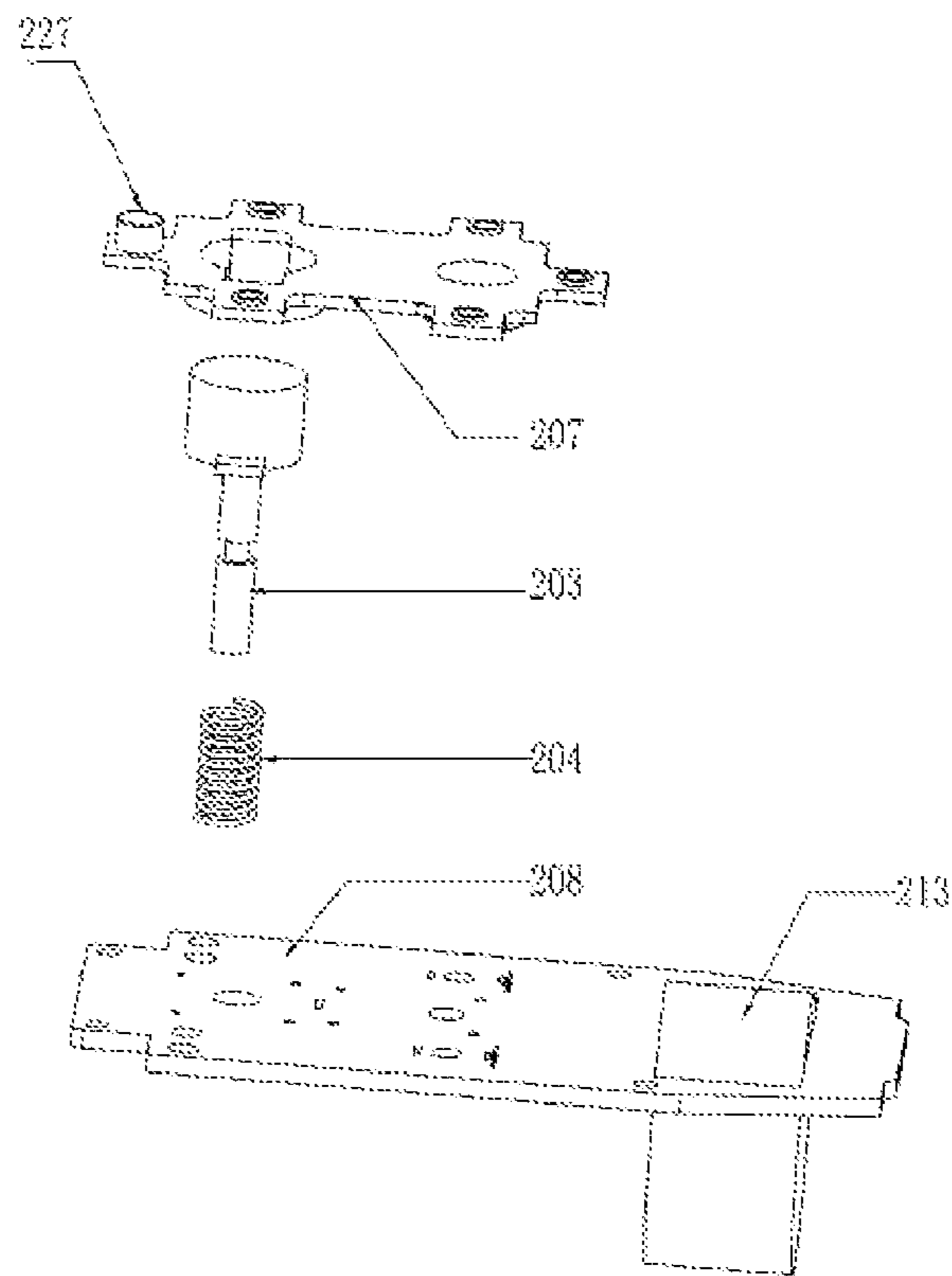
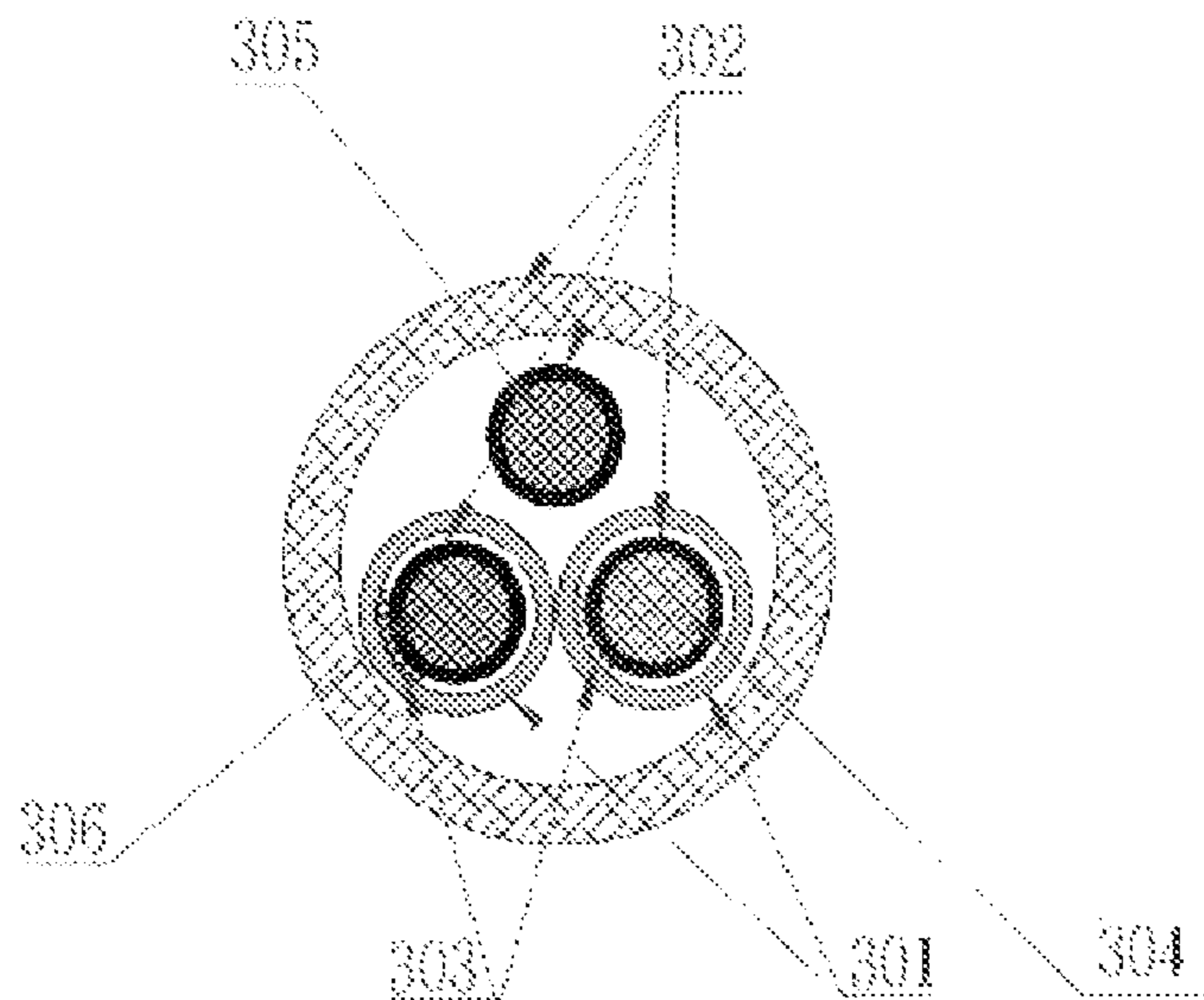


FIG. 4



**FIG. 5**



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## LEAKAGE CURRENT DETECTING CIRCUIT-BREAKER WITH A FLEXIBLE SHIELD CORD

### TECHNICAL FIELD

The invention relates to the field of leakage current protection, more particularly, to a leakage current detecting circuit-breaker.

### BACKGROUND ART

With the social progress and rapid economic development, leakage current protecting products are more and more widely used in people's daily life and work. In order to protect various electrical devices in a circuit and to detect a leakage current in the circuit in time, a leakage current detecting circuit-breaker is generally arranged in the circuit. The leakage current detecting circuit-breaker is such a device that it can promptly detect and amplify a leakage current signal to control a tripping mechanism so as to immediately disconnect a power supply, when there is a leakage current or an electric arc between a live line (L-line) and a neutral line (N-line), thereby protecting the personal and property safety. A leakage current detecting circuit-breaker generally comprises a detection circuit, a trigger circuit and a tripping mechanism. In the conventional art, a chip of a regular leakage current detecting circuit-breaker is used as the central control module and functions to amplify a leakage current signal in the case that the leakage current or an electric arc is detected. The requirement of the amplification chip makes the production cost of the conventional leakage current detecting circuit-breaker high. Moreover, the anti-interference performance of the currently available leakage current detecting circuit-breakers is poor, which can easily cause false triggering of the leakage current detecting circuit-breaker.

### DISCLOSURE OF THE INVENTION

In order to overcome the above disadvantages of the conventional art, the invention provides a leakage current detecting circuit-breaker which is of low production cost and strong anti-interference capacity.

According to the technical solution of the present invention, a leakage current detecting circuit-breaker comprises a detection circuit, a trigger circuit and a tripping mechanism, wherein the detection circuit detects and amplifies an abnormal or fault signal of a power line and transmits the amplified signal to the trigger circuit, such that the trigger circuit is turned on, thereby controlling the tripping mechanism to be disengaged and then disconnecting a current connection to a load end. The detection circuit comprises a flexible shield cord, a zero sequence current transformer and diodes connected in series. The flexible shield cord comprises a foil wrapped around outer insulating layers of a L line and a N line and a tinned copper wired between the outer insulating layers and the foil. The flexible shield cord senses the abnormal or fault signal of the power line, and the zero sequence current transformer amplifies the abnormal or fault signal to such an extent as to trigger the trigger circuit. The diodes comprise a fifth diode and a sixth diode, where anodes of the fifth diode and the sixth diode are connected to each other, and cathodes of the fifth diode and the sixth diode are respectively connected to the L line and the N line. When leakage current occurs during normal operation, an unbalanced signal generated by the leakage current is trans-

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mitted to the zero sequence current transformer via the flexible shield cord; the unbalanced signal is amplified by the zero sequence current transformer and then outputted to the trigger circuit, turning the trigger circuit on, thereby controlling the tripping mechanism to be disengaged and ensuring the safe operation of devices on the load end.

As an example, the detection circuit further comprises an operating current limiting resistor, a testing current limiting resistor and a test button. The operating current limiting resistor is connected in series between the flexible shield cord and a primary coil of the zero sequence current transformer; the testing current limiting resistor and the test button are connected in series between the L-line and the primary coil of the zero sequence current transformer. The provision of the operating current limiting resistor and the testing current limiting resistor has the effect of bypassing voltage, so as to limit the leakage current of the leakage current detecting circuit-breaker during normal operation and test.

As an example, the trigger circuit comprises a rectifier bridge, a silicon controlled rectifier and a tripping coil connected in series. A gate of the silicon controlled rectifier is connected to an output terminal of the zero sequence current transformer; power is supplied to the rectifier bridge via the L-line and the N-line. When a leakage current is present in the power line, the leakage current is transmitted to the primary coil of the zero sequence current transformer via the flexible shield cord, and arrives at the output terminal of the zero sequence current transformer after being amplified, turning the silicon controlled rectifier turn on, thereby providing power to the tripping coil, and then controlling the tripping mechanism to be disconnected (a movable contact and a static contact are disconnected).

As an example, the trigger circuit further comprises an anti-interference circuit, which is connected in parallel between the anode and the cathode of the silicon controlled rectifier and comprises a second capacitor connected to the anode of the silicon controlled rectifier and a fourth resistor connected to the cathode of the silicon controlled rectifier. The provision of the anti-interference circuit prevents external interferences from causing misoperation of the leakage current detecting circuit-breaker.

As an example, the trigger circuit further comprises a protection circuit, which comprises a first capacitor and a third current limiting resistor respectively connected in parallel between output terminals of the zero sequence current transformer. The first capacitor being connected in parallel prevents misoperation of the triggering circuit due to installation or wiring mistakes. The third current limiting resistor being connected in parallel can provide suitable current to the gate of the silicon controlled rectifier. Thus, the protection circuit can protect the silicon controlled rectifier, preventing the silicon controlled rectifier from being damaged due to electric parameters applied thereto being larger than rated electric parameters for an extended period of time.

As an example, the tripping coil comprises a fixed frame, an iron core, an iron core reset spring, a pulling tab and a reed bridge. The fixed frame is integrated with a coil framework. The iron core reset spring is located at one end of the iron core and both are arranged within the fixing frame. The other end of the iron core is provided with a clamping groove. One end of the pulling tab is fixed in the clamping groove, and the other end is inserted into the reed bridge. In the leakage current detecting circuit-breaker of the present invention, integration of the fixed frame and the coil



framework prevents possible errors during assembly and improves reliability of the assembly.

As an example, the tripping mechanism comprises a reset switch, a circuit board and a contact switch. Power is supplied to the rectifier bridge by closing the reset switch, which is arranged as perpendicular to the circuit board, and the contact switch is actuated by the tripping coil. Through the closure of the reset switch, power is supplied to the rectifier bridge. When the leakage current occurs in the power line, the power is supplied to the tripping coil, which then actuates the contact switch.

As an example, the reset switch comprises a reset button and a reset spring, and the reset button comprises a reset press-button and a pulling rod fixed together through injection molding. The reset switch can move up and down inside of the tripping mechanism, so as to control turning on or off of the contact switch.

As an example, the tripping mechanism further comprises a base seat and an upper cover closed together by screws, a test button is protruded from the upper cover, and an upper surface of the upper cover is provided with bosses to prevent the test button from being false triggered.

As an example, the contact switch comprises a static contact, a static contact fixing sheet, a movable contact and a reed. The static contact is riveted to the circuit board through the static contact fixing sheet; the movable contact is riveted to the reed. Positions of the static contact and the movable contact correspond with each other, and the reed and the reed bridge are fixed together vertically through injection molding.

The present invention has the following advantageous effects: the leakage current on the flexible shield cord is detected and amplified by using the unbalanced property of the zero sequence current transformer. It is verified that amplifying the leakage current by using the zero sequence current transformer in place of the chip is safe and reliable, which reduces the production cost of the circuit-breaker protection device. In addition, the leakage current detecting circuit-breaker provided by the present invention has strong anti-interference capacity.

#### BRIEF DESCRIPTION OF DRAWINGS

The present invention will be described in detail in conjunction with the drawings in the following.

FIG. 1 illustrates a schematic circuit diagram of a leakage current detecting circuit-breaker with a flexible shield cord in accordance with the present invention;

FIG. 2 illustrates an exploded perspective view of the mechanical structure of the leakage current detecting circuit-breaker with a flexible shield cord in accordance to the present invention;

FIG. 3 illustrates an exploded perspective view of a tripping coil in FIG. 2;

FIG. 4 illustrates an exploded perspective view of a reset switch and a circuit board in FIG. 2; and

FIG. 5 illustrates a cross section view of a flexible shield cord of the leakage current detecting circuit-breaker.

#### DETAILED DESCRIPTION

In the following, embodiments of the invention will be described in detail with reference to the drawings. The exemplary embodiments are provided to make it possible for a person of ordinary skilled in the art to clearly understand the present invention and to implement the present invention according to the description. The drawings and detailed

embodiments are not intended to limit the present invention; instead the scope of the invention is defined by the appended claims.

FIG. 1 illustrates a schematic circuit diagram of a leakage current detecting circuit-breaker with a flexible shield cord in accordance with the present invention. The leakage current detecting circuit-breaker of the present invention comprises a detection circuit, a trigger circuit and a tripping mechanism. The operation principle of the leakage current detecting circuit-breaker is as follows: the detection circuit detects and amplifies an abnormal or fault signal of a power line and transmits the amplified signal to the trigger circuit, turning the trigger circuit on, thereby controlling the tripping mechanism to be disengaged and then disconnecting a current connection to a load end.

As illustrated in FIG. 1, the detection circuit comprises a flexible shield cord 225, a zero sequence current transformer (ZSCT) 213 and diodes connected in series. FIG. 5 illustrates a cross section of the flexible shield cord of the leakage current detecting circuit-breaker. As shown in FIG. 5, the flexible shield cord 225 comprises a L-line 101, a N-line 102 and a ground (GND) line, wherein the L-line, the L-line and the GND line respectively comprise a L-line core 304, a N-line core 306, a GND-line core 305 and outer insulating layers 302 wrapped around the L-line core, the N-line core and the GND-line core. The flexible shield cord 225 further comprises a foil 301 wrapped around the outer insulating layers 302 of the L-line and the N-line and a tinned copper wire between the outer insulating layers and the foil. The flexible shield cord 225 can sense the abnormal or fault signal of the power line, that is, it may function to detect abnormal leakage currents between the L-line 101 and the N-line 102, between the L-line 101 and the GND-line, as well as between the N-line 102 and the GND line. The abnormal or fault signal is transmitted to the ZSCT 213, which amplifies the abnormal or fault signal to such an extent as to trigger the trigger circuit.

As an example, in the flexible shield cord of the invention, a conductive side of the foil 301 faces inwards and the tinned copper wire 303 may be 8 tinned copper wires with a diameter of  $\Phi 0.16$  mm.

As an example, for a 14 AWG power line, cores of the L-line, the N-line and the GND lines may be made of 41 copper wires of  $\Phi 0.254$  mm, which will respectively has an outer diameter of  $\Phi 3.5$  mm with the outer insulating layer. The outer diameter of the whole flexible shield cord may be  $\Phi 10.3$  mm. As another example, for a 16 AWG or 18 AWG power cord, cores of the L-line, the N-line and the GND line may be respectively made of 26 copper wires of  $\Phi 0.254$  mm or 41 copper wires of  $\Phi 0.160$  mm, which will respectively has an outer diameter of  $\Phi 3.1$  mm or  $\Phi 2.8$  mm with the outer insulating layer. The outer diameter of the whole flexible shield cord may be  $\Phi 9.60$  mm or  $\Phi 9.10$  mm.

In the detection circuit, the diodes comprise a fifth diode (D5) 107 and a sixth diode (D6) 112. Anodes of the fifth diode 107 and the sixth diode 112 are connected to each other, and cathodes of which are respectively connected to the L-line 101 and the N-line 102. As the fifth diode 107 and the sixth diode 112 are half wave rectifier components, the leakage current, may it be on the L-line 101 or on the N-line 102, can always be detected by the detection circuit of the invention. For example, if there is leakage current on the L-line 101, a signal of the leakage current passes through the flexible shield cord 225 and the primary coil of the ZSCT 213, and arrives at the N-line 102 via the sixth diode 112, thus forming a loop circuit. If there is leakage current in the N-line 102, a signal of the leakage current passes through the



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flexible shield cord **225** and the primary coil of the ZSCT **213**, and arrives at the L-line **101** via the fifth diode **107**, thus forming a loop circuit.

The detection circuit of the present invention further comprises an operating current limiting resistor (R1) **110**, a testing current limiting resistor (R5) **109** and a test button (S1 of FIG. 1). The operating current limiting resistor **110** is connected in series between the flexible shield cord **225** and the primary coil of the ZSCT **213**, and the testing current limiting resistor **109** and the test button are connected in series between the L-line **101** and the primary coil of the ZSCT **213**. The operating current limiting resistor **110** functions to limit the current during normal operation of the leakage current detecting circuit-breaker of the present invention, and the testing current limiting resistor **109** functions to limit the current during test and is turned on via the test button (S1).

As shown in FIG. 1, the trigger circuit comprises a rectifier bridge **103**, a silicon controlled rectifier **113** and a tripping coil **104** connected in series. The gate of the silicon controlled rectifier **113** is connected to an output terminal of the ZSCT **213**, the rectifier bridge **103** is connected in parallel between the L-line and the N-line of the power line and is thus powered. When a leakage current occurs in the power line, the leakage current is transmitted to the primary coil of the ZSCT **213** via the flexible shield cord **225**, and arrives at the output terminal of the ZSCT **213** after being amplified, turning the silicon controlled rectifier **113** on, supplying power to the tripping coil **104**, and then controlling the tripping mechanism to be disconnected (a movable contact and a static contact are disconnected).

FIG. 2 illustrates an exploded perspective view of the mechanical structure of the leakage current detecting circuit-breaker with a flexible shield cord in accordance with the present invention. FIG. 3 illustrates an exploded perspective view of a tripping coil **104** of FIG. 2. As shown in FIGS. 2 and 3, the tripping coil **104** comprises a fixed frame **216**, an iron core **217**, an iron core reset spring **218**, a pulling tab **214** and a reed bridge **215**, wherein the fixed frame **216** is integrated with a coil framework, that is, the fixed frame **216** is a fixed frame having the coil framework. The iron core reset spring **218** is located at one end of the iron core **217** and both are arranged within the fixing frame **216**, the other end of the iron core **217** is provided with a clamping groove (no reference number indicated for which in the figures). One end of the pulling tab **214** is fixed in the clamping groove, and the other end is inserted into the reed bridge **215** and corresponds to a clamping groove of a pulling rod of a reset button **203**. The fixing frame **216** is fixed on a circuit board **208** through a CP wire (copper-tinlead wire). In the leakage current detecting circuit-breaker of the present invention, integration of the fixed frame and the coil framework prevents possible assembly mistakes and improves reliability of the assembly.

It can be seen from FIG. 1 that the trigger circuit further comprises an anti-interference circuit **114**, which is connected in parallel between anode and cathode of the silicon controlled rectifier **113** and comprises a second capacitor (C2) connected to the anode of the silicon controlled rectifier **113** and a fourth resistor (R4) connected to the cathode of the silicon controlled rectifier **113**. The anti-interference circuit **114** protects the silicon controlled rectifier **113**, preventing misoperation of the leakage current detecting circuit-breaker caused by external interferences. The external interferences generally comprise voltage interference, electrical equipment interference and environmental interference.

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As illustrated in FIG. 1, the trigger circuit further comprises a protection circuit **105**, which comprises a first capacitor (C1) and a third current limiting resistor (R3) respectively connected in parallel between output terminals of the ZSCT **213**. The first capacitor (C1) being connected in parallel prevents misoperation by the triggering circuit due to installation or wiring mistakes. The third current limiting resistor (R3) provides a current limiting signal to the silicon controlled rectifier **113**, enabling the provision of a suitable current to the gate of the silicon controlled rectifier. Thus, the protection circuit can protect the silicon controlled rectifier, thereby preventing the silicon controlled rectifier from being damaged due to electric parameters applied thereto being larger than rated electric parameters for an extended time. In case the flexible shield cord **225** detects an abnormal current signal during normal operation of the leakage current detecting circuit-breaker of the present invention, the abnormal current signal passes through the primary coil of the ZSCT **213** and is amplified by the ZSCT **213**. After being current-limited by the third current limiting resistor (R3), a signal current is provided to trigger the gate of the silicon controlled rectifier **113**, which is then turned on, thus providing power to the tripping coil **104**.

As shown in FIGS. 1 and 2, the tripping mechanism comprises a reset switch (S2), the circuit board **208** and a contact switch. Power is supplied to the rectifier bridge **103** when the reset switch (S2) is closed. The reset switch (S2) is arranged as perpendicular to the circuit board **208**, and the contact switch is actuated by the tripping coil **104**. Through the closure of the reset switch, power is supplied to the rectifier bridge **103**. When the leakage current occurs in the power line, power is supplied to the tripping coil **104**, which then actuates the contact switch.

FIG. 4 illustrates an exploded perspective view of the reset switch and the circuit board of FIG. 2. As shown in FIGS. 2 and 4, the reset switch (S2) comprises a reset button **203** and a reset spring **204**, and the reset button **203** comprises a reset press-button and a pulling rod fixed together through injection molding. The tripping mechanism further comprises a base seat **221** and an upper cover **201** closed together by screws **223**, a test button **205** is protruded from the upper cover **201**, and an upper surface of the upper cover **201** is provided with bosses **226** for preventing the test button **205** from being false triggered. A height of the bosses **226** is higher than a height of the test button **205** protruded above the upper surface of the upper cover **201**. A press cover **207** is provided on an inner surface of the upper cover **201**, and a shade sheet **227** is provided on the press cover **207**, where the shade sheet **227** is dustproof and has the effect of presenting working state of the leakage current detecting circuit-breaker.

As shown in FIG. 2, the contact switch comprises a static contact **212**, a static contact fixing sheet **209**, a movable contact **211** and a reed **210**, where the static contact **212** is riveted to the circuit board **208** through the static contact fixing sheet **209**, the movable contact **211** is riveted to the reed **210**, positions of the static contact **212** and the movable contact **211** correspond to each other, and the reed **210** and the reed bridge **215** are fixed together vertically through injection molding.

Action process during normal operation of the tripping mechanism of the leakage current detecting circuit-breaker according to the present invention will be described in the following.

When no leakage current exists in the power line, the reset switch (S2) is closed, and the movable contact **211** and the static contact **212** are connected, thereby supplying power to



the rectifier bridge 103. When there is a leakage current in the power line, the current signal amplified by the ZSCT 213 turns the gate of the silicon controlled rectifier 113 on, thereby supplying power to the tripping coil 104. The fixed frame 216 integrated with the coil framework turns on, 5 allowing the iron core 217 to overcome acting force of the iron core reset spring 218 and to move toward the right and rear direction shown in FIG. 2 or to the right direction shown in FIG. 3. As one end of the pulling tab 214 is fixed in the clamping groove of the iron core 217, the pulling tab 214 is 10 forced to move along this direction. The pulling tab 214 is moved outside of the clamping groove of the pulling rod of the reset button 203, the reset button 203 moves upwards under the acting force of the reset spring 204, the reed bridge 215 moves downwards under the acting force of the reed 15 210, thus separating the movable contact 211 and the static contact 212, completing the tripping operation and then disconnecting the current connection to the load end, thereby ensuring the safety of use of devices on the load end.

The reset operation of the reset switch (S2) will be 20 described in the following. The reset button 203 can move vertically only as a result of its position and the reed bridge 215 also moves vertically under the action of the pulling rod of the reset button 203. When the reset button 203 is pressed, the pulling rod of the reset button 203 will move down- 25 wards. When the clamping groove at the lower end of the pulling rod is flush with the pulling tab 214, the iron core 217 pushes the pulling tab 214 to move forwards under the acting force of the iron core reset spring 218, making the front end of the pulling tab 214 to be directly clamped in the 30 clamping groove of the pulling rod. When the reset button 203 is released, the reset button 203 will move upwards under the acting force of the reset spring 204, and the pulling tab 214 moves upward together with the reset button 203, bringing the reed bridge 215 and the reed 210 to move 35 upwards together. When the movable contact 211 and the static contact 212 are connected, the movement is stopped, the reset operation is completed, and the input and output of the leakage current detecting circuit-breaker are turned on.

In the leakage current detecting circuit-breaker with the 40 flexible shield cord of the present invention, the ZSCT is used in place of chip to amplify the leakage current, which safely and reliably reduces the production cost of circuit-breaker protection device. Moreover, the leakage current detecting circuit-breaker with the flexible shield cord pro- 45 vided by the present invention has a strong anti-interference capability.

What are described above is merely the preferable 50 embodiments of the present invention and does not intend to limit the present invention. Various modifications and changes may be made by a person of ordinary skill in the art to the present invention. Any amendment, replacement and improvement made without departing from the spirit and principle of the present invention are within the protection 55 scope of the present invention.

What is claimed is:

1. A leakage current detecting circuit-breaker with a flexible shield cord comprising a detection circuit, a trigger circuit and a tripping mechanism, wherein the detection circuit detects and amplifies an abnormal or fault signal of 60 a power line and transmits the amplified signal to the trigger circuit, so that the trigger circuit is turned on, thereby controlling the tripping mechanism to be disengaged and then disconnecting a current connection to a load end,

wherein the detection circuit comprises a flexible shield 65 cord, a zero sequence current transformer and diodes connected in series, the flexible shield cord comprises

a metal foil wrapped around outer insulating layers of a live line and a neutral line and a tinned copper wire between the outer insulating layers and the foil, the flexible shield cord senses the abnormal or fault signal of the power line, the zero sequence current transformer amplifies the abnormal or fault signal to such an extent as to trigger the trigger circuit, the diodes comprise a fifth diode and a sixth diode, anodes of the fifth diode and the sixth diode are connected to each other, and cathodes of the fifth diode and the sixth diode are respectively connected to the live line and the neutral line;

wherein the trigger circuit comprises a rectifier bridge, a silicon controlled rectifier and a tripping coil connected in series, a gate of the silicon controlled rectifier is connected to an output terminal of the zero sequence current transformer, and power is supplied to the rec- 5 tifier bridge via the live line and the neutral line;

wherein the trigger circuit further comprises an anti- 10 interference circuit the anti-interference circuit is connected in parallel between an anode and a cathode of the silicon controlled rectifier and comprises a second capacitor connected to the anode of the silicon controlled rectifier and a fourth resistor connected to the 15 cathode of the silicon controlled rectifier.

2. The leakage current detecting circuit-breaker with a flexible shield cord according to claim 1, wherein the trigger circuit further comprises a protection circuit, the protection circuit comprises a first capacitor and a third current limiting 20 resistor respectively connected in parallel between output terminals of the zero sequence current transformer.

3. A leakage current detecting circuit-breaker with a flexible shield cord, comprising a detection circuit, a trigger circuit and a tripping mechanism, wherein the detection circuit detects and amplifies an abnormal or fault signal of 25 a power line and transmits the amplified signal to the trigger circuit, so that the trigger circuit is turned on, thereby controlling the tripping mechanism to be disengaged and then disconnecting a current connection to a load end,

wherein the detection circuit comprises a flexible shield 30 cord, a zero sequence current transformer and diodes connected in series, the flexible shield cord comprises a metal foil wrapped around outer insulating layers of a live line and a neutral line and a tinned copper wire between the outer insulating layers and the foil, the flexible shield cord senses the abnormal or fault signal of the power line, the zero sequence current transformer amplifies the abnormal or fault signal to such an extent as to trigger the trigger circuit, the diodes comprise a fifth diode and a sixth diode, anodes of the fifth diode and the sixth diode are connected to each other, and cathodes of the fifth diode and the sixth diode are respectively connected to the live line and the neutral line;

wherein the trigger circuit comprises a rectifier bridge, a silicon controlled rectifier and a tripping coil connected in series, a gate of the silicon controlled rectifier is connected to an output terminal of the zero sequence current transformer, and power is supplied to the rec- 35 tifier bridge via the live line and the neutral line;

wherein the tripping coil comprises a fixed frame, an iron core, an iron core reset spring, a pulling tab and a reed bridge, the fixed frame is integrated with a coil frame- 40 work, the iron core reset spring is located at one end of the iron core and both the iron core reset spring and the iron core are arranged within the fixed frame, the other end of the iron core is provided with a clamping

groove, one end of the pulling tab is fixed in the clamping groove, and the other end is inserted into the reed bridge;

wherein the tripping mechanism comprises a reset switch, a circuit board and a contact switch, power is supplied 5 to the rectifier bridge through the closure of the reset switch, the reset switch is arranged as perpendicular to the circuit board, and the contact switch is actuated by the tripping coil;

wherein the contact switch comprises a static contact, a 10 static contact fixing sheet, a movable contact and a reed, the static contact is riveted to the circuit board through the static contact fixing sheet, the movable contact is riveted to the reed, positions of the static contact and the movable contact correspond to each 15 other, and the reed and the reed bridge are fixed together vertically through injection molding.

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